

Revision of the Neotropical genus *Mulfordia* Malloch (Diptera, Muscidae)

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ABSTRACT. Revision of the Neotropical genus *Mulfordia* Malloch (Diptera, Muscidae). The present paper provides a revision of *Mulfordia* Malloch (Diptera, Muscidae), including redescrptions of the genus and of its three species. The descriptions are complemented with illustrations of some characters to make the recognition of the species easier and to help the use of the key. The male terminalia of *M. ferruginea* Malloch is described for the first time.

KEYWORDS. Insecta; morphology; Neotropical; taxonomy.

The genus *Mulfordia* (Diptera, Muscidae) was described by Malloch (1928) based on one female of *Mulfordia ferruginea* from Bolivia. The genus now includes three species, *M. ferruginea* Malloch, 1928, *M. longipes* (Stein, 1911) and *M. secunda* Snyder, 1951. *Mulfordia longipes* was originally described by Stein (1911) in *Mydaea* and posteriorly transferred to *Mulfordia* by Pont (1972).

The genus is little known and very poorly represented in collections (practically only the type material). After the original descriptions of the species, no other paper treated them, except catalogues (Séguy 1937; Pont 1972; Carvalho *et al.* 1993, 2005), keys to identification (Couri & de Carvalho 2002) and a short reference to the type specimen of *M. ferruginea* (Carvalho 1980). The distribution of the species of the genus is limited to the Neotropical region and, according to the present knowledge, is restricted to Bolivia and Peru.

Species of *Mulfordia* can be recognized by the absence of prealar seta, dorsocentrals 2+3, suprasquamal ridge setulose, katepisternals 1+2, posterior spiracle triangular and with a few black hairs on center, hind coxa setulose on posterior surface and R_{4+5} with few short ventral setulae at base. The genus was originally positioned among the Phaoninae, but in the current classification of Muscidae (Carvalho *et al.* 2005), it is positioned within the subfamily Cyrtoneurinae.

This paper aims to provide a revision of the three species included in *Mulfordia*, including redescrptions of the genus and of the species and a key to their identification. Complete redescrptions are presented, except for the terminalia of *M. longipes* and *M. secunda* as the dissections were not allowed by the curators of the museums where the material is deposited, due to the scarcity of specimens in the collections. Only the terminalia of the type-species, *M. ferruginea*, was dissected, described and illustrated.

MATERIAL AND METHODS

The holotypes of *M. ferruginea* and *M. longipes*, deposited respectively at National Museum of Natural History

(USNM) and *Staatliches Museum für Tierkunde* (SMT), were directly examined. The redescription of the holotype of *M. secunda* was based on photos gently sent by the Diptera curator and by the photographer of the American Museum of Natural History (AMNH), where the type is deposited. Personal notes of Dr. Dalci Albuquerque on the holotype were also used. The terminology followed McAlpine *et al.* (1981) and Stuckenberg (1999) for postpedicel. Colour images were taken with a stereomicroscope Leica MZ16 and assembled using Syncroscopy Auto-Montage.

Mulfordia Malloch, 1928

Mulfordia Malloch, 1928: 467. Type-species: *Mulfordia ferruginea* Malloch, 1928 (orig. des.). Refs.: Séguy 1937: 279 (cat.); Pont 1972: 48 (cat.); Carvalho *et al.* 1993: 56 (cat.); Couri & de Carvalho 2002: 149 (key to species) and Carvalho *et al.* 2005: 92 (cat.)

Diagnosis. Male holoptic (*M. longipes*) or dichoptic (*M. ferruginea*). Arista plumose; prosternum bare; prealar absent; dorsocentrals 2+3; scutellum with cilia on margins; anepimeron with 1–3 short fine hairs on upper margin; suprasquamal ridge with fine cilia close to base; katepisternals 1+2, posterior spiracle triangular and with a few black hairs on center, meron with fine discal setulae; hind coxa haired on posterior surface; calcar absent; vein M_{1+2} slightly curved at the apex to R_{4+5} in *M. ferruginea* and straight in *M. longipes* and *M. secunda*, R_{4+5} with few short ventral setulae near base (Fig. 1). Sternite 1 haired. Male terminalia as in Figs 2–7 (based on the holotype of *M. ferruginea*).

Discussion. *Mulfordia* was added to the cladistic analysis of Couri & Carvalho (2003). The analysis positioned *Mulfordia* among the Cyrtoneurinae (as Dichaetomyiinae in the paper) confirming its position among the subfamilies of Muscidae.

Note. In Carvalho & Couri (2002) key to Muscidae genera, *Mulfordia* runs to couplet 21. With the examination of the type material, we corrected the disposition of the katepisternals to 1+2, so, it is necessary to make the follow-

ing correction in the key to correctly reach the genus *Mulfordia*.

21. Suprasquamal ridge setulose or with only few fine cilia near base 22
 – Suprasquamal ridge bare 23
22. Dorsocentral setae 2:3; prosternum bare
 *Mulfordia* Malloch [Part II, page 149]
 – Dorsocentral setae 2:4; prosternum setulose
 *Scutellomusca* Townsend [Part II, page 172]

Key to species

1. General colour yellow ferrugineous; acrostichals 0:1; wing veins R_{4+5} and M slightly convergent at apex
 *M. ferruginea* Malloch
- 1'. General colour brown with grey pollinosity; acrostichals 0:0; wing veins R_{4+5} and M parallel at apex 2
2. Wing infuscated; legs brown *M. longipes* (Stein)
- 2'. Wing clear; legs with femora and tibia light brown
 *M. secunda* Snyder

Mulfordia ferruginea Malloch, 1928

(Figs 1–12)

Mulfordia ferruginea Malloch, 1928: 467. Holotype male (not gynandromorph as in Carvalho *et al.* 2005), USNM. Type-locality: Bolivia, Tumupasa. Distr.- Bolivia.

Mulfordia ferruginea; Séguy 1937: 279 (cat.); Pont 1972: 48 (cat.); Carvalho 1980: 57 (short reference on the possibly gynandromorph type); Carvalho *et al.* 1993: 56 (cat.); Couri & Carvalho 2002: 149 (key to species); Carvalho *et al.* 2005: 92 (cat.).

Length. body: 7.8 mm; wing: 7.2 mm.

General coloration. Yellow ferrugineous. Head with frons dark brown and lunule slightly reddish; parafacial, fronto-orbital plate and gena yellow ferrugineous, with a slightly grey pollinosity; postpedicel yellow ferrugineous and arista yellow; palpus dark brown; notum with traces of four brown vittae on prescutum and with a silver pollinosity close to head, under certain lights; pleurae brown. Anterior spiracle brownish yellow. Halter, calypters and wing yellowish. Legs with femora and tibia yellow; tarsi brown. Abdomen yellow ferrugineous with no marks.

Head. (Fig. 8 and 9) Dichoptic; eyes with very few hairs, 6 pairs of fronto-orbital setae, the basal stronger, the median ones fine and the upper one long, back and outwards directed; ocellar seta very long; antenna inserted a little below middle of eyes, postpedicel about 3.2 times the length of the pedicel; arista with long plumae. Vibrissa strong, longer than the length of arista; palpus short and filiform; proboscis strong, labellum well developed.

Thorax. (Figs 11 and 12). Acrostichals 0:1; dorsocentrals 2+3 the first one about half of the length of the other; 1 postpronotal; 2 presuturals; 2 intra-alars; 2 supra-alars; notopleuron with 2 setae, scutellum with one short basal pair

and a long sub-basal and apical pairs of setae; anterior spiracle elongated; anepisternum with ground cilia and a series of six long setae on the posterior edge; katepisternals 1:2 with the postero-superior seta longer than the others; posterior spiracle triangular. Wing with vein R_{4+5} and M slightly convergent at apex. Vein R_{4+5} with short cilia at base. Legs with fore femur with a row of posterodorsal, dorsal and posteroventral setae; fore tibia with one median anterodorsal seta; apical setae on posterodorsal, posteroventral, dorsal and ventral surfaces; claws and pulvilli short. Mid femur with one median and one pre-apical anterodorsal setae; ventral surface with two long setae on basal third; posterior surface with two pre-apical setae and dorsal surface with one pre-apical; mid tibia with two posterior setae inserted on the limits of the thirds; all surfaces with apical setae, the ventral one longer than the others. Hind femur with a complete anterodorsal row of setae, stronger on apical fourth; anteroventral surface with a row of setae more developed on apical third; hind tibia with two anteroventral setae on middle third and one median anterodorsal; dorsal, ventral and anteroventral surfaces with an apical setae.

Abdomen. (Fig. 10). Long, tergites 1+2–4 with one strong lateral pair of setae; tergites 4 and 5 with one median pair of setae. Sternite 1 setulose. Sternite 5 high, almost three times higher than wider (Fig. 2); sternite 6 asymmetric, only with left arm developed (Figs 3 and 5).

Terminalia. Cercal plate longer than wide in dorsal view (Fig. 4); epandrium, cercal plate, surstylus and sternite 6 as in Fig. 5; phallic complex as in Figs 6 and 7.

Material examined. Holotype. Tumupasa/Bolivia Dec/W. M. Mann. Mulford Biol. Expl./1921-1922./Type N [no number]/USNM [red label]. *Mulfordia ferruginea* Type/Det. J. R. Malloch.

Discussion. Malloch (1928) described the species based in one female from Bolivia (Tumupasa), collected by the Mulford Biological Expedition. Dr. Dalci Albuquerque in his personal notes on the type mentioned that it was a male and not a female and that Malloch could have been confused by the dichoptic condition of the head of the specimen. Albuquerque also called attention to the different aspect of the male terminalia and that the specimen could be a gynandromorph. The dissection the specimen terminalia confirmed that the holotype is a male.

Mulfordia longipes (Stein, 1911)

(Figs 13–16)

Mulfordia longipes Stein, 1911: 80 (*Mydaea*). Holotype male, SMT. Type-locality: Bolivia, Lorenzopata. Distr.- Bolivia.

Mydaea longipes; Stein 1919: 120 (cat.); Séguy 1937: 287 (cat.).

Mulfordia ? *longipes*; Pont 1972: 48 (cat.; new combination); Carvalho *et al.* 1993: 56 (cat.).

Mulfordia longipes; Pont 2001: 476 (notes on type); Couri & de Carvalho 2002: 149 (key to species); Carvalho *et al.* 2005: 92 (cat.).

Length. body: 8 mm; wing: 7.4 mm.

General coloration (Fig. 13). Brown with grey pollinosity. Head with frons brown, lunule, parafacial, fronto-orbital plate



Figs. 1–10. *Mulfordia ferruginea* Malloch, male: 1. wing, ventral view; 2. sternite 5, dorsal view; 3. sternite 6, dorsal view; 4. cercal plate, dorsal view; 5. epandrium, cercal plate, surstyli and sternite 6, right lateral view; 6. phallic complex, dorsal view; 7. phallic complex, lateral view; 8. head, frontal view; 9. head, lateral view; 10. abdomen, lateral view. Scale bars: 0.1 mm.

and gena brown, grey pollinose; antenna and arista dark brown; palpus dark brown; notum, with traces of four brown vittae on prescutum; pleurae brown with grey pollinosity. Anterior spiracle brown. Calypters whitish with margins light brown. Wing brown smoky, especially on apical longitudinal third. Legs brown. Abdomen brown, grey pollinose.

Head. Holoptic; eyes with short and sparse hairs, 5 pairs of fronto-orbital setae, all close to lunule, the basal stronger; ocellar setae very long; antenna inserted on middle of eyes, postpedicel about 3.2 times the length of the pedicel; arista with long plumae. Vibrissa strong, longer than the length of arista; palpus short, filiform.

Thorax (Fig. 14). Acrostichals indistinct; dorsocentrals 2+3; 1 postpronotal long; 2 presuturals; 2 intra-alars; 2 supra-alars; notopleuron with 2 setae, scutellum with one long basal and one long apical pairs of setae; anterior spiracle elongated; anepisternum with a series of five setae on the posterior edge, one of them shorter than the others; katepisternals 1:2 with the postero-superior seta longer than the others; posterior spiracle triangular. Wing with R_{4+5} and M parallel at apex (Fig. 15). Legs with fore femur with a row of posterodorsal, dorsal and posteroventral setae; fore tibia with one supra median anterodorsal seta; apical setae on posterodorsal, posteroventral, dorsal and ventral surfaces; claws and pulvilli short. Mid legs broken. Hind femur with complete anterodorsal and anteroventral rows of setae; hind tibia with one anterodorsal median and two anteroventral inserted on the limits of the thirds; preapical anterodorsal and anteroventral and a long anterior apical seta.

Abdomen. Long, tergites 1+2-4 with one strong lateral pair of setae; tergites 4 and 5 with one median pair of setae. Sternite 1 setulose.

Material examined. Holotype male, SMT: Bolivia-Mapiri/2000m. 6.v.03/Lorenzopata. Coll. W. Schnuse/1911-3. Mydaea/longipes/sp. nov. [Stein's label]. Holotype/Mulfordia/longipes/Stein, 1911/Conf. A. C. Pont 1999 (Fig. 16).

Discussion. Pont (2001) examined the type during the re-curation of the families Fanniidae and Muscidae in the SMT collection and confirmed the transference of the species to *Mulfordia*.

Mulfordia secunda Snyder, 1951

(Figs 17–20)

Mulfordia secunda Snyder, 1951: 4. Holotype female, AMNH. Type-locality: Peru, Junín, Chanchamayo. Distr.-Peru. Refs.: Pont 1972: 48 (cat.); Carvalho *et al.* 1993: 57 (cat.); Couri & de Carvalho 2002: 149 (key to species) and Carvalho *et al.* 2005: 92 (cat.).

Length. Female: body: 8–9 mm.

General coloration. (Fig. 17). Brown with gray pollinosity. Head with frons face, parafacial, fronto-orbital plate and gena brown; antenna with apex of pedicel and base of postpedicel brown, flagellomere dark brown pollinose and arista light brown; proboscis and palpus dark brown; mesonotum,

presuturally, bluish-black, grey pollinose with traces of four dark vittae; pleura brown. Anterior spiracle light brown. Halter yellow; calypters white; wing hyaline. Legs with femora and tibia light brown; tarsi brown. Abdomen grey with no marks.

Head (Fig. 18). Dichoptic; eyes with very few hairs, six pairs of fronto orbital seta, the basal and the apical ones stronger, the median ones fine and the upper one long and outwards directed; antenna inserted below middle of eyes; antenna with postpedicel about 3.2 times length of the pedicel; arista with long plumae. Vibrissa strong, longer than the length of arista; palpus filiform.

Thorax (Fig. 19). acrostichals 0:0; dorsocentrals 2+3; 1 postpronotal; 2 intra-alars; prealar absent; 2 supra-alars; notopleuron with 2 setae; scutellum with one long basal pair and short sub-basal and apical pairs of setae; anterior spiracle elongated prosternum bare; three proepisternals; anepisternum with ground cilia and a series of four setae on the posterior edge; katepisternals 1:2 with the postero-superior seta longer than the others; posterior spiracle triangular. Wing with vein R_{4+5} and M parallel at apex (Fig. 20). Legs with fore femur with a row of posterodorsal, dorsal and posteroventral; fore tibiae with a median anterodorsal setae; claws and pulvilli short. Mid femur on ventral surface with two long setae on basal third; posterior surface with three pre-apical setae; mid tibia with two anterodorsal setae; dorsal and ventral surfaces with apical seta, the last one longer than the others. Hind femur with one strong and one weak sub-apical anteroventral setae, the base of anteroventral and posteroventral surfaces with a few basal hairs; hind tibiae with one anterodorsal and two anteroventral median setae.

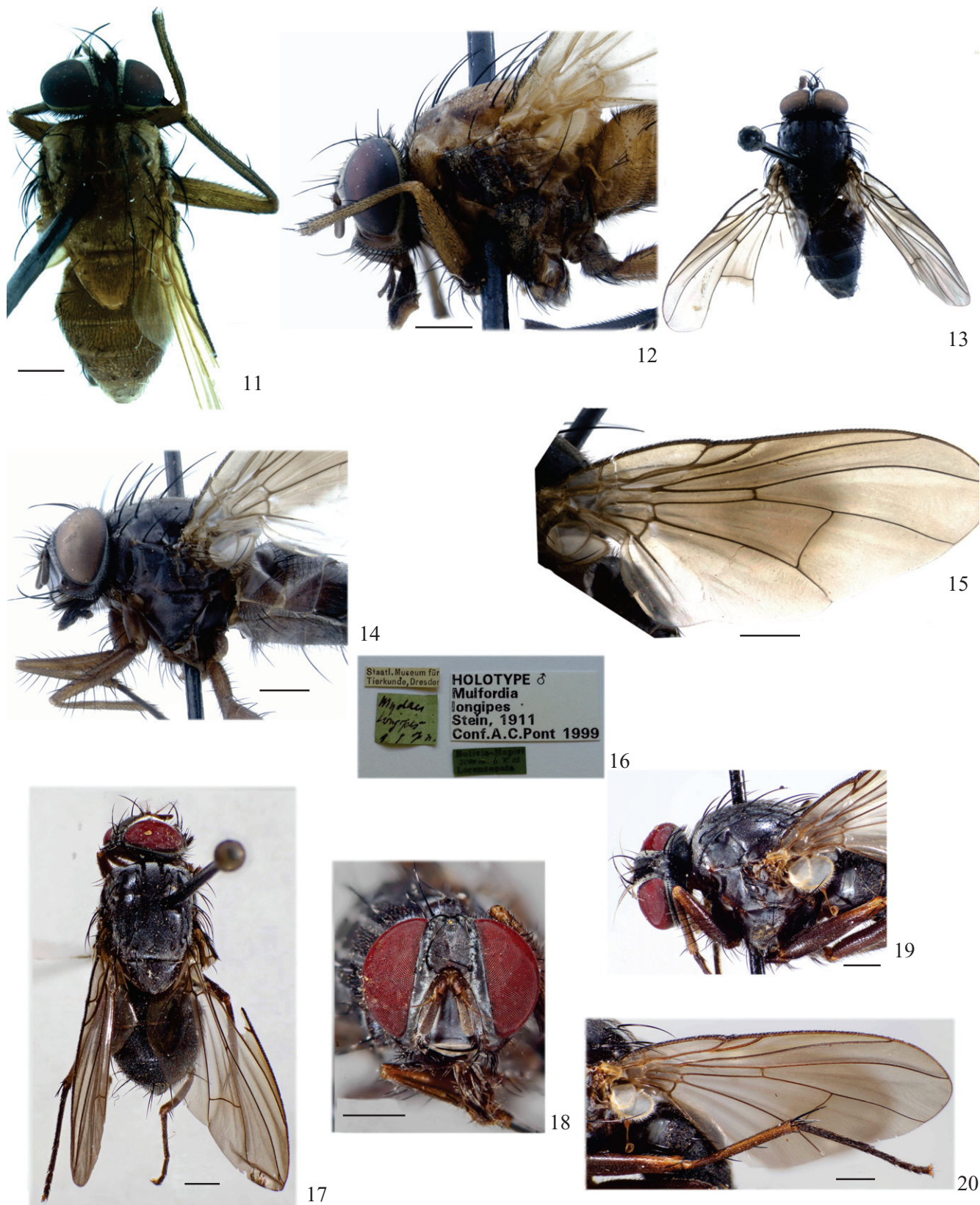
Abdomen. Lanceolate, tergites 1+2 with one strong lateral pair of setae; tergites 3 with a row of about six long apicals setae and tergites 4 with a row of four apicals setae. Sternite 1 setulose.

Material examined (type specimen examined only through photographs). Holotype female, AMNH: Chanchamayo/Department of Junin/Peru/May 18, 1948 (José M. Schunk).

Discussion. The type series also includes seven female paratypes. Snyder (1951) placed this species in *Mulfordia* with some hesitation, as it differs from the type-species, *M. ferruginea*, in not having the fourth vein slightly curved forward at apex and in having two pairs of posterior parafacial bristles, instead of one. But the presence of the setulose hairs on the hind coxae above and on the suprasquamal ridge were sufficient, according to him to place it in *Mulfordia*.

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Figs. 11–21. 11. *Mulfordia ferruginea* Malloch, male, dorsal lateral view; 12. *Mulfordia ferruginea* Malloch, male, thorax, lateral view; 13. *Mulfordia longipes* (Stein), male, dorsal view; 14. *Mulfordia longipes* (Stein), male, thorax, lateral view; 15. *Mulfordia longipes* (Stein), male, wing, lateral view; 16. *Mulfordia longipes* Malloch, holotype labels; 17. *Mulfordia secunda* Snyder, female, dorsal, view; 18. *Mulfordia secunda* Snyder, female, head, frontal view; 19. *Mulfordia secunda* Snyder, female, thorax, lateral view; 20. *Mulfordia secunda* Snyder, female, wing. Scale bars: 1.0 mm.

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